# 3.1.1 AFCEE Requirements for Application of the Data Quality Objectives Process for Human Health and Ecological Risk Assessments

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## Introduction

The Data Quality Objectives (DQO) process is a series of planning steps used to define the criteria that a data-collection design should satisfy (U.S. EPA, 2000a; 2000b). The DQO process ensures that the collection of environmental data is tied to specific problems that need to be solved and decisions that need to be made. DQOs are developed based on specific, well-formulated questions that need to be answered to enable sufficiently informed and technically defensible remedial decisions. The developed DQOs then serve as the basis for designing a data-collection strategy that will produce the type, quantity, and quality of data needed to adequately answer these questions in an efficient and cost-effective manner.

The successful implementation of the DQO process for both human health and ecological risk assessments requires the participation of risk managers, risk assessors, and other appropriate professionals and stakeholders. Risk managers generally include the remedial project manager (RPM) or base environmental coordinator (BEC), as well as the state and U.S. EPA RPMs participating in the Environmental Restoration Program (ERP). The risk managers are the ultimate decision makers. During the DQO process, the risk managers are responsible for characterizing the decisions that must be made and supported by the risk assessment. The risk assessors are responsible for presenting a comprehensive data-collection strategy in a work plan (WP) and sampling and analysis plan (SAP) designed to obtain the data needed to support the decision-making process.

## AFCEE Requirements

DQOs will be developed in accordance with U.S. EPA's DQO process for hazardous waste sites during the planning of any site or background investigation to obtain data for a human health or ecological risk assessment (U.S. EPA, 2000b). The DQOs will (1) clearly express the purpose and objectives of the investigation, (2) identify the schedule, resources, milestones, and regulatory requirements, (3) define the most appropriate type and quantity of data to collect, (4) describe the most appropriate conditions—how, when, and where—for data collection, and (5) specify or describe tolerable limits on decision errors and uncertainties.

The investigation will not begin until the risk managers agree on the DQOs and the data-collection strategy documented in a WP and SAP is finalized with the signature approval of the risk managers. The AFCEE must be notified promptly whenever the risk managers cannot reach agreement on the DQOs or the sampling strategy for an investigation.

**Recommended Practices and Guidance**

The risk assessors contracted with the AFCEE should ensure that the DQOs are technically defensible, consistent with an up-to-date conceptual site model (CSM), and clearly linked to unanswered questions to be addressed using the data obtained from the investigation. The risk assessors should also work with the risk managers to develop a sampling and analysis strategy to meet the DQOs developed for the investigation.

The full DQO process consists of seven steps (U.S. EPA, 2000a; 2000b):

1. State the problem
2. Identify the decisions to be made
3. Identify inputs to the decision
4. Define the study boundaries
5. Develop a decision rule
6. Specify limits on decision errors
7. Optimize the design for obtaining data

DQOs are qualitative and quantitative statements derived from the first six steps of this process. The DQO process should be dynamic and flexible during the development of the DQOs, and the outputs from one step should lead to a reconsideration of other steps whenever appropriate. The detail of the DQOs that are developed and documented in a WP and SAP will depend on the size and complexity of the investigation.

All seven steps of the DQO process should be developed as appropriate for any data-collection effort conducted to support a human health or ecological risk assessment. Some of the statistical elements of steps 5, 6, and 7 may not be applicable if a statistical hypothesis cannot be formulated and linked to a clear decision. The degree to which the decision will depend on a statistical analysis rather than a qualitative evaluation will be determined by the nature of the risk assessment (screening or baseline), the DQOs developed (quantitative and qualitative statements), and the data (quantitative and qualitative information) that will be available through the planned and the previous investigations to meet the DQOs. If statistical approaches are not used to develop DQO steps 5, 6, or 7, explanations of these decisions and alternative qualitative approaches should be documented in the WP and SAP.

Step 1 in the DQO process includes the development or refinement of the CSM (U.S. EPA, 2000b). An accurate CSM is critical because it will serve as the foundation for all subsequent inputs and decisions during the DQO process. Note that this step corresponds to “problem formulation” in screening and baseline ecological risk assessments (U.S. EPA, 1997).

If both human health and ecological risk assessments are planned for a site, the DQOs and sampling and analysis strategy should be developed in a manner that avoids the duplication of efforts. When appropriate, human health and ecological risk assessors should coordinate their activities and communicate with each other throughout the DQO

process. The early development of CSMs and DQOs by a multi-disciplinary team that includes human health and ecological risk assessors will substantially increase the likelihood that the data needed for both assessments will be obtained through the investigation.

Generally, the DQOs, data-collection design, and quality assurance/quality control procedures will be integrated in the quality assurance project plan to present and document a coherent plan for collecting the data. After data collection is completed, the data will be evaluated during the data quality assurance process to determine whether the DQOs have been met (U.S. EPA, 2000a; 2000b; 2000c).

**References**

U.S. EPA. 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final.* U.S. Environmental Protection Agency: EPA/630/R-95-002F.

U.S. EPA. 2000a. *Guidance for the Data Quality Objectives Process (QA/G-4), Final.* U.S. Environmental Protection Agency: EPA/600/R-96-055.

U.S. EPA. 2000b. *Data Quality Objectives Process for Hazardous Waste Site Investigations (QA/G-4HW), Final.* U.S. Environmental Protection Agency: EPA/600/R-00-007.

U.S. EPA. 2000c. *Guidance for Data Quality Assessment: Practical Methods for Data Analysis (QA/G-9QA96).* U.S. Environmental Protection Agency: EPA/600/R-96-084.